

Kankan Bhattacharyya (1954–2022)

Kankan Bhattacharyya, one of India's most accomplished physical chemists and a leader in the area of condensed phase chemical dynamics passed away in a Kolkata hospital on 10 November 2022. With his departure the country has lost not only one of her internationally recognized scientists, but also a passionate administrator who has contributed significantly as the Director of the Indian Association for the Cultivation of Science (IACS) from 2009 to 2013, where he spent most of his scientific career. Kankan-da (as he was fondly called by many of those younger than him following an age-old Bengali tradition) was a tireless worker fascinated by science and its intricacies. Toward the end of his career he had health issues, which he fought with all his might and will to live. A few months before he lost his battle with colon cancer, he wrote his biography *Of Molecules, Time and Space, Resolution: An Autobiography of Kankan Bhattacharyya* (*J. Phys. Chem.*, 2022, **126**, 3644–3649), where he has given a candid description of his agony and ecstasy of being a scientist. Science was his dedication to work, his moments of delight and fun, and, in a nutshell, his life.

Kankan Bhattacharyya was born on 17 November 1954 in Kolkata to Dharendra Ranjan Bhattacharyya and Pratima Bhattacharyya. His father was the headmaster of Jodhpur Park Boys' School and lived with his wife and five children on the school campus. Kankan-da was the youngest. While growing up in an academic environment provided by the school, his mother's commitment to work and his father's insight into learning and teaching had a great impact on him. His father told him, 'Learning a subject becomes complete only when one can teach others'. His early education was in his father's school where his mathematics teacher K. D. Saha emphasized learning mathematics to develop logical thinking and the English language to express oneself. After finishing school, he went to Presidency College, University of Calcutta, for his undergraduate education, where he took chemistry as his 'Honours' subject. At that time, the Naxalite movement for the liberation of Bengal was at its peak and the schools, colleges and universities bore the brunt of it. Kankan-da's leaning toward the leftist ideology perhaps developed around that time and he joined student unions and became an active member (in his own language) 'to protect our tea-

chers and institutions'. After obtaining his Master's degree from the University of Calcutta in 1976, he wanted to become a chemistry teacher, but after a couple of years he joined the Ph.D. programme of IACS and worked under the supervision of Prof. Mihir Chowdhury. He completed his thesis work by 1984 and found his spouse Kinkini in IACS, to whom he got married in the same year. Kankan Bhattacharyya then left for a postdoctoral assignment under Dr Paritosh Kumar Das of the Indiana Radiation Laboratory, USA. He stayed there for two



years until he moved to work with Prof. Kenneth Eisenthal (1986–87) at the Chemistry Department of Columbia University, New York, USA. In Columbia, his paper on the substantially lower dissociation constant of nitrophenol at the air–water interface than the bulk water probed by surface second harmonic generation (*J. Chem. Phys.*, 1987, **87**, 1442–1443) drew the attention of the scientific community and he was immediately noticed.

He returned to his Alma Mater, IACS as a senior lecturer in 1987, where he remained for 29 years until his formal retirement in 2016 at the age of 62. He was also the Director of the Institute from 2009 to 2013 and during his directorship hired many talented faculty in the Institute, who are all now well-established scientists in their own rights. He had a knack for spotting talent and nurturing it. After retirement from IACS he spent five years in IISER Bhopal, where he became a sought-after teacher among the students. He could always present complex problems in simple terms, which was appreciated by the students. His lectures on popular topics were refreshing and engaging, where he would refer to the

history of Indian science, narrate anecdotes from the lives of eminent scientists and talk about the struggles of a scientist before cracking an important problem.

At IACS, Kankan-da initially worked on the photophysics of dimethyl-amino-benzonitrile (DMABN) in the confined environment of cyclodextrin cavities. He found that a difference in the cavity size of 1 Å (one part of 10 billion m) between α - and β -cyclodextrins changed the spectral property drastically (*Chem. Phys. Lett.*, 1988, **151**, 474–476; 1989, **157**, 83–86). He was thrilled to discover that fluorescent probes have nanometric spatial resolution. Soon, he escalated the idea to study solvation dynamics of water in nano-confinements provided by micelles and reverse micelles (*J. Phys. Chem.*, 1996, **100**, 10523–10527) and showed that solvation time becomes significantly slower in the inside water pool of organized structures. The most important discovery he made along the same line is that biological water displays a slow component of solvent relaxation that is two to three orders of magnitude retarded than bulk water (*J. Phys. Chem. B*, 2001, **105**, 1438–1441). This also provided the 'experimental proof' of the Nandi–Bagchi theory (*J. Phys. Chem. A*, 1998, **102**, 8217–8221) of slow dielectric relaxation of bound water on the protein surface compared to bulk water. Soon, the ultraslow component of bound water in biological medium generated much interest nationally and internationally. Later, he moved to time-resolved confocal microscopy to achieve both space and time resolution, and boldly moved to probe dynamics in live cells. He discovered that cancer cells have significantly more lipid droplets than normal cells, which could be used to diagnose cancer (*J. Phys. Chem. B*, 2015, **119**, 10868–10875). His work on repeated binding and unbinding of a specific siRNA to the target mRNA of a breast cancer cell in millisecond timescale before gene silencing due to stochastic resonances (*J. Phys. Chem. Lett.*, 2014, **5**, 1012–1016) is a significant advance in our understanding of gene silencing patterns in cancer cells. During his many years of active research, 32 students graduated from his group, many of whom are now professors in various institutions across India. He also trained and nurtured a large number of project students, postdoctoral research associates and short-term workers during his career. A personal account of his own

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research journey can be read from his autobiography mentioned above.

Kankan-da has been widely recognized for his contribution to physical and biophysical chemistry. He received numerous awards and fellowships starting with the Shanti Swarup Bhatnagar Prize awarded by the Council of Scientific and Industrial Research (1997), TWAS Prize in Chemistry (2007), and the JC Bose Fellowship of the Department of Science and Technology, Government of India (2007–21). He was elected to the fellowships of all three Science Academies in India and The World Academy of Sciences. He served the physical chemistry community as a Senior Editor of the *Journal of Physical Chemistry* (2008–20).

Kankan-da believed that to accomplish anything significant, dedication and com-

mitment are essential. His uncompromising commitment as a teacher, as a guide, as an organizer and as an administrator is challenging to match. He cared for excellence in the pursuit of science and loved to talk about science with everyone. He was kind-hearted and always ready to help his friends, colleagues and others whenever they were in difficulty. He was a person with a great sense of humour. Many of us vividly remember his witty prescription of what problems to solve to certainly win a Nobel Prize in Chemistry! He was a charmer in informal gatherings of friends and colleagues, and he would entertain all of us with old Hemant Kumar's songs with his whinny baritone voice.

Kankan-da is and will be sorely missed by the chemistry fraternity for a long time. His wife, who was his lifelong supporter

and partner, died in 2009. Now he leaves behind a set of students, associates, colleagues and friends whose lives he touched and enlightened. People who knew him well greatly valued the conversations with him and his friendship. It was a pleasure to know him as a friend (P.K.D.) and a privilege to have worked under him as a graduate student (P.S.).

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